

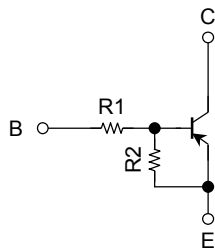
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process) (Bias Resistor built-in Transistor)

## RN2101FT, RN2102FT, RN2103FT RN2104FT, RN2105FT, RN2106FT

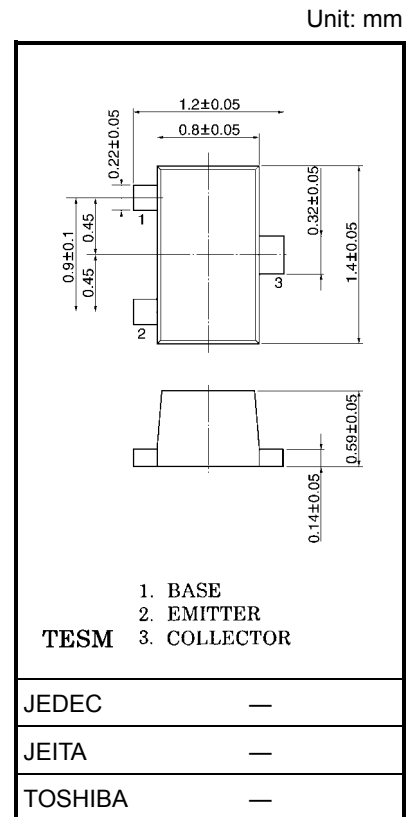
Switching, Inverter Circuit, Interface Circuit and Driver Circuit Applications.

- High-density mount is possible because of devices housed in very thin TESM packages.
- Incorporating a bias resistor into a transistor reduces parts count. Reducing the parts count enable the manufacture of ever more compact equipment and save assembly cost.
- Wide range of resistor values are available to use in various circuit designs.
- Complementary to RN1101FT~1106FT

### Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2101FT	4.7	4.7
RN2102FT	10	10
RN2103FT	22	22
RN2104FT	47	47
RN2105FT	2.2	47
RN2106FT	4.7	47



Weight: g (typ.)

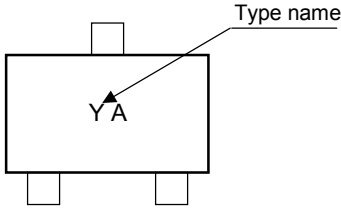
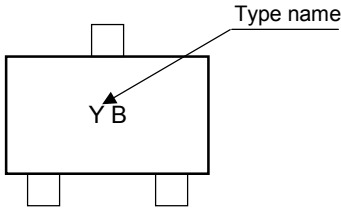
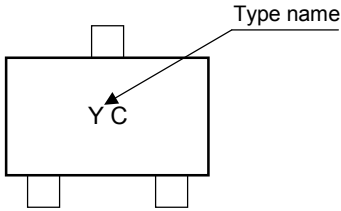
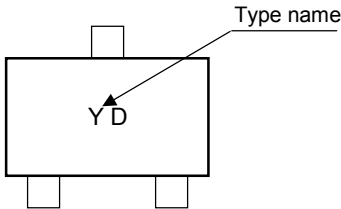
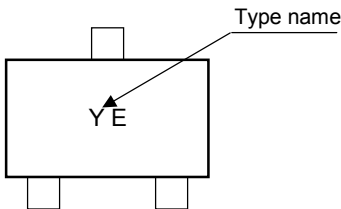
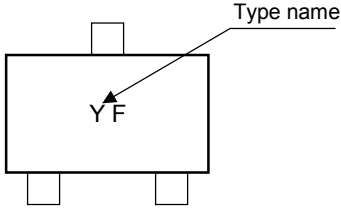
### Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage	RN2101FT~2106FT	V <sub>CBO</sub>	-50	V
Collector-emitter voltage		V <sub>CEO</sub>	-50	V
Emitter-base voltage	RN2101FT~2104FT	V <sub>EBO</sub>	-10	V
	RN2105FT, RN2106FT		-5	
Collector current	RN2101FT~2106FT	I <sub>C</sub>	-100	mA
Collector power dissipation		P <sub>C</sub> (Note)	100	mW
Junction temperature		T <sub>j</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55~150	°C

Note: Total rating

## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2101FT~2106FT	$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-100	nA
		$I_{CEO}$	$V_{CE} = -50\text{ V}, I_B = 0$	—	—	-500	
Emitter cut-off current	RN2101FT	$I_{EBO}$	$V_{EB} = -10\text{ V}, I_C = 0$	-0.82	—	-1.52	mA
	RN2102FT			-0.38	—	-0.71	
	RN2103FT			-0.17	—	-0.33	
	RN2104FT		-0.082	—	-0.15		
	RN2105FT		$V_{EB} = -5\text{ V}, I_C = 0$	-0.078	—	-0.145	
	RN2106FT			-0.074	—	-0.138	
DC current gain	RN2101FT	$h_{FE}$	$V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$	30	—	—	
	RN2102FT			50	—	—	
	RN2103FT			70	—	—	
	RN2104FT			80	—	—	
	RN2105FT			80	—	—	
	RN2106FT			80	—	—	
Collector-emitter saturation voltage	RN2101FT~2106FT	$V_{CE(sat)}$	$I_C = -5\text{ mA}, I_B = -0.25\text{ mA}$	—	-0.1	-0.3	V
Input voltage (ON)	RN2101FT	$V_{I(ON)}$	$V_{CE} = -0.2\text{ V}, I_C = -5\text{ mA}$	-1.1	—	-2.0	V
	RN2102FT			-1.2	—	-2.4	
	RN2103FT			-1.3	—	-3.0	
	RN2104FT			-1.5	—	-5.0	
	RN2105FT			-0.6	—	-1.1	
	RN2106FT			-0.7	—	-1.3	
Input voltage (OFF)	RN2101FT~2104FT	$V_{I(OFF)}$	$V_{CE} = -5\text{ V}, I_C = -0.1\text{ mA}$	-1.0	—	-1.5	V
	RN2105FT, 2106FT			-0.5	—	-0.8	
Transition frequency	RN2101FT~2106FT	$f_T$	$V_{CE} = -10\text{ V}, I_C = -5\text{ mA}$	—	200	—	MHz
Collector output capacitance	RN2101FT~2106FT	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	RN2101FT	R1	—	3.29	4.7	6.11	kΩ
	RN2102FT			7	10	13	
	RN2103FT			15.4	22	28.6	
	RN2104FT			32.9	47	61.1	
	RN2105FT			1.54	2.2	2.86	
	RN2106FT			3.29	4.7	6.11	
Resistor ratio	RN2101FT~2104FT	R1/R2	—	0.9	1.0	1.1	
	RN2105FT			0.0421	0.0468	0.0515	
	RN2106FT			0.09	0.1	0.11	

Type Name	Marking
RN2101FT	
RN2102FT	
RN2103FT	
RN2104FT	
RN2105FT	
RN2106FT	

**RESTRICTIONS ON PRODUCT USE**

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.